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CONTRIBUTION TO THE KNOWLEDGE OF THE TRACE FOSSILS FOUND ON THE MOLLUSCS IN THE MOLLUSCAN CLAY OF NYÁRJAS HILL /NOVAJ, HUNGARY

ABSTRACT: The author examines the occurrence and distribution of trace fossils on the molluscs of the Molluscan Clay of Nyárjas Hill. There are four types of trace fossils have been found in the material collected at this locality.

INTRODUCTION: Of the several Upper Oligocene outcrops in the environs of Eger /North-Hungary/, the most complete one is the Nyárjas Hill at Novaj. This locality lies about five km, north of Novaj /Fig.:1/.

The Upper Oligocene layers of the outcrop are exposed in a 20 metres long and one meter deep ditch on the western slope of Nyárjas Hill /Fig.:2/. The molluscan clay beds of this succession contain well-preserved mollusc fauna in an exceptional richness.
The aim of my investigation has been to examine the number and distribution of trace fossils in the collected material.

METHODS: Fifteen kilograms of molluscan clay was collected from the locality. After drying, the sample was treated by hot water and peroxide of hydrogen. This material was washed out through a 0,5mm sieve. Finally, the molluscan remains were assorted from among the other fossils /e.g. Foraminifera, Decapoda, Echinoidea, Osteichthyes/.

Most of the molluscs were fragmentary, but also many complete specimens and specimens in cast preservation were found.

The complete shells and identifiable fragments were inspected for the presence of trace fossils. In the case of cast recognition of trace fossils is often uncertain and doubtful.

DESCRIPTION: The molluscan remains of the sample consist of 275 individuals representing 32 species /Table 1/. Trace fossils can be seen on the tests of 13 individuals of 8 species. 4.7 percent of individuals and 25 percent of species bear trace fossils in the collected material. 87.5 percent of the species bearing trace fossils were the member of the infauna. Distribution of trace fossils according to feeding habits of mollusc species is the following:

suspension feeders:	62.5 percent
scavengers and predators:	12.5 percent
parasites:	25.0 percent

The 15 pieces of trace fossils can be assigned to four types /Table 2/.

A fragmentary specimen of ***Cadulus gracilina*** bears characteristic traces of fungal boring /Plate I, Fig.1/. Cresentic shape of a presumably bite trace is observable on the margine of a ***Crassatella bosqueti minor*** valve.

There is a fragment of a ***Flabellipecten burdigalensis*** right valve with a complete muricid boring. The characteristic cylindrical borehole can be seen between two furrows at the margin /Plate I, Fig.2/.

12 naticid boreholes can be found in the shells of 10 specimens of six species.

The number of complete boreholes is eight. While the number of incomplete boreholes is four. There are five ***Crassatella bosqueti minor*** valves which bear a single naticid boring. Among the incomplete boreholes two can be seen is the right valve of a ***Corbula gibba*** /Fig.3/, /Plate II, Fig. 1. 2./. A specimen of ***Niso minor*** bears traces of multiple predation, too /Plate III. Fig. 1. 2. /. A complete and an incomplete boreholes can be seen on its test /Fig. 4./.

CONCLUSION: From an examination the occurrence and distribution of trace fossils on the shells of the molluscs of the Molluscan Clay of Nyárjas Hill it is possible to reconstruct food chains, to give more detailed picture of the trophic levels in the fossil community. As it is shown by the results of these preliminary examinations it is worth continuing the investigations at this locality.

LITERATURE CITED

1. Báldi, T. /1973/: Mollusc fauna of the Hungarian Upper Oligocene /Egerian/ Akadémiai Kiadó, Budapest, 511 p.
2. Báldi, T. /1986/: Mid-Tertiary Stratigraphy and Paleographic Evolution of Hungary Akladémiai Kiadó, Budapest, 201 p.
3. Dávid, Á. /1991/: New Paleoecological Observations on the Shells of Upper-Oligocene Molluscs /Wind Brickyard, Eger, Hungary/ (in Hungarian) Malakológiai Tájékoztató, 9. 12–14 pp.
4. Kitchell, J. A. et al. /1986/: Anomalies in Naticid Predatory Behavior: a Critique and Experimental Observations Malacologica, 27 (2): 291–298 pp.

Table 1.

LIST OF SPECIES, NYÁRJAS HILL

1.	Yoldia raulini	1*
2.	Glycymeris sp.	1
3.	Limopsis anomala	2
4.	Flabellipecten burdigalensis	6
5.	Chlamys csepreghymeznericsea	8
6.	Astarte gracilis degrangei	4
7.	Crassatella bosqueti minor	25
8.	Cardita cf. ruginosa	3
9.	Cavilucina droueti schloenbachi	1
10.	Cardium sp.	14
11.	Venus multilamella	3
12.	Angulus posterus	15
13.	Corbula gibba	1
14.	Turritella sp.	1
15.	Architectonica mariae	1
16.	Bittium spina agriense	11
17.	Cerithiella sp.	3
18.	Natica millepunctata tigrina	1
19.	Hinia schlotheimi	12
20.	Aquilofusus loczyi	1
21.	Olivella clavula vindobonensis	1
22.	Turricula leganyii	2
23.	Niso minor	4
24.	Turbonilla sp.	6
25.	Melanella spina	1
26.	M. naumanni depressosuturata	4
27.	Syrnola laterariae	4
28.	Ringicula auriculata paulucciae	7
29.	Cylichna cylindracea raulini	5
30.	Dentalium simplex	7
31.	Fustiaria taurogracilis	10
32.	Cadulus gracilina	9
	Total:	275

* number of individuals

TABLE 2.

TYPES AND DISTRIBUTION OF TRACE FOSSILS ON THE MOLLUSCS OF THE MOLLUSCAN CLAY OF NYÁRJAS HILL, NOVAJ

LIST OF SPECIES BEARING TRACE FOSSILS	HABITAT	FEEDING HABITS	NT	A	B	C	D
FLABELLIPECTEN BURDIGALENSIS	EPIFAUNAL	SUSPENSION FEEDER	6/1			X	
CRASSATELLA BOSQUETI MINOR	INFAUNAL	SUSPENSION FEEDER	25/6		X		X
CARDIUM SP.	INFAUNAL	SUSPENSION FEEDER	14/1				X
CORBULA	INFAUNAL	SUSPENSION FEEDER	1/1				X
BITTIUM SPINA	INFAUNAL	SUSPENSION FEEDER	112/1				X
NISO MINOR	INFAUNAL	PARASITE	4/1				X
SYRNOLA LATERARITE	INFAUNAL	PARASITE	4/1				X
CADULUS	INFAUNAL	PREDATOR	9/1	X			

NT - number of individuals/number of individuals bearing trace fossil
A: fungal boring, **B:** presumed bite traces, **C:** Muricid boring, **D:** Naticid boring

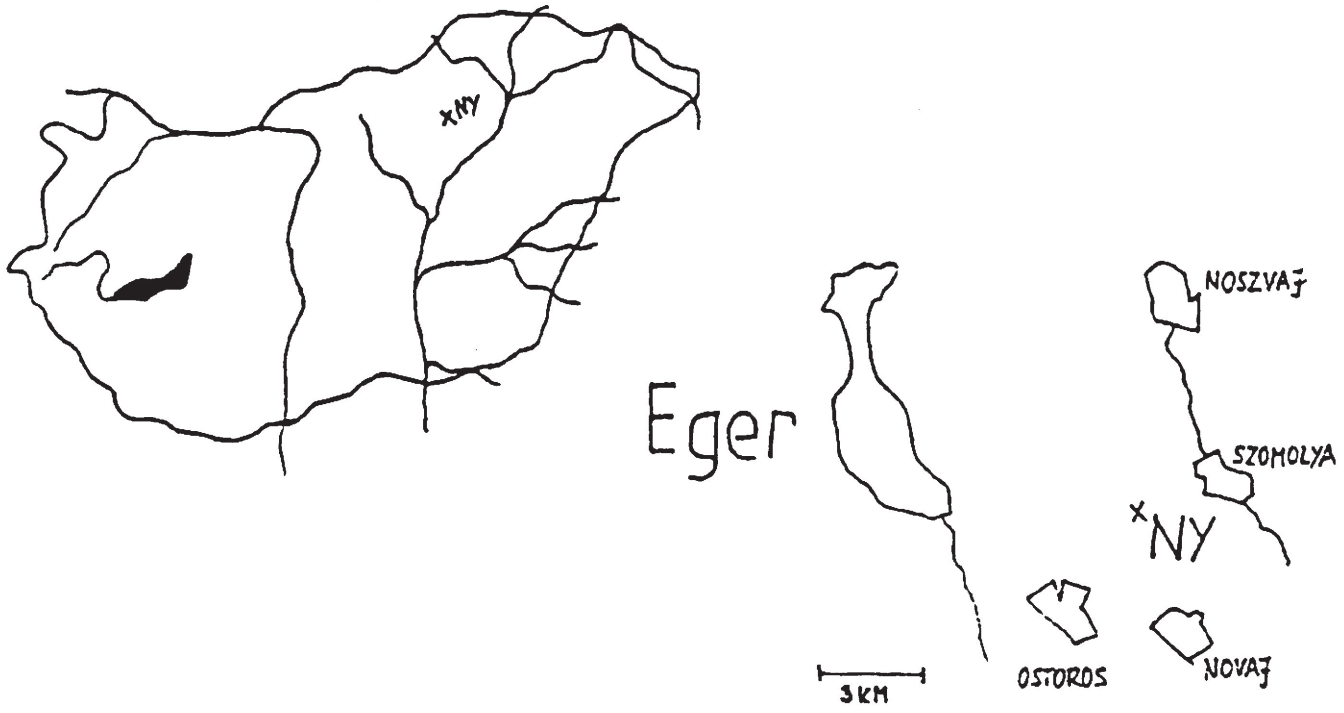


fig. 1.: Map sketch of the locality.

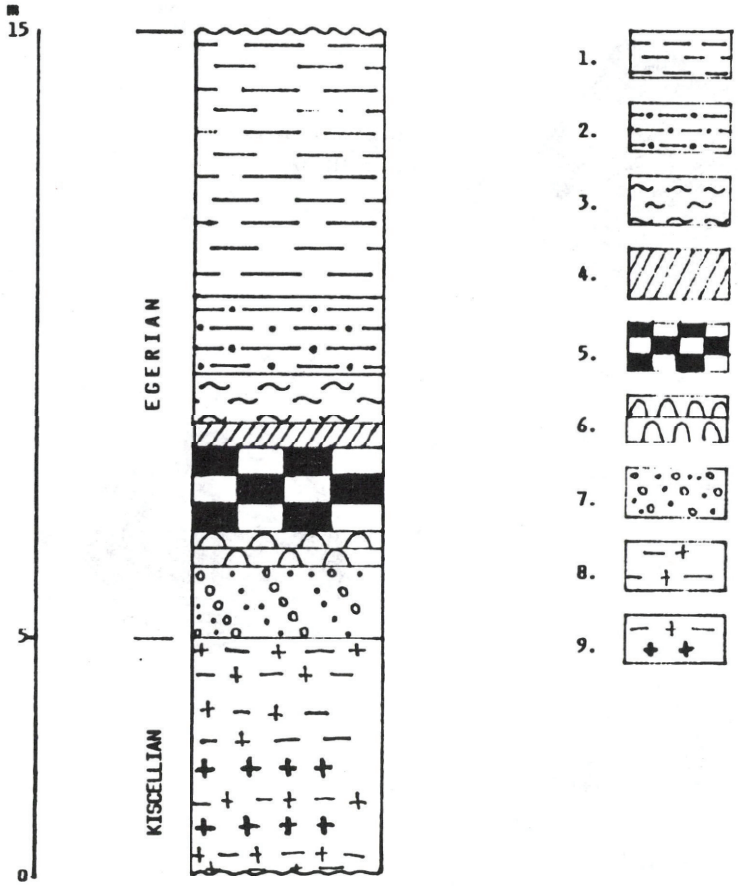
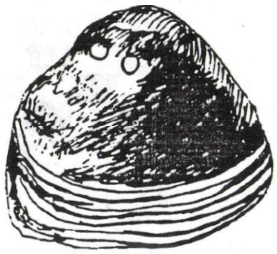


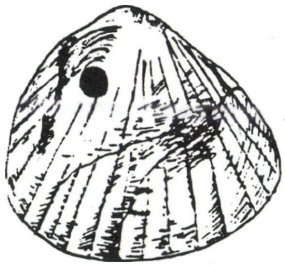
fig. 2.: Geological profile of the locality
(after T. Báldi)

1. MOLLUSCAN CLAY, 2. clayey glauconitic fine sandstone, 3. yellow tuffaceous glauconitic silty marl, 4. limestone with Lepidocyclines, 5. limestone with Lithothamnium, 6. oil-grey Lepidocyclina bearing marl, 7. glauconitic coarse sandstone, 8. tuffitic clay, 9. tuff transformed to bentonit.

Crassatella bosqueti
minor /10 X/

Corbula gibba
/6,5 X/





Cardium sp. /15 X/

fig. 3.: Positions of Naticid borings in three species of bivalves
/ Nyárjass Hill, Novaj /

○ incomplete boring
● complete boring

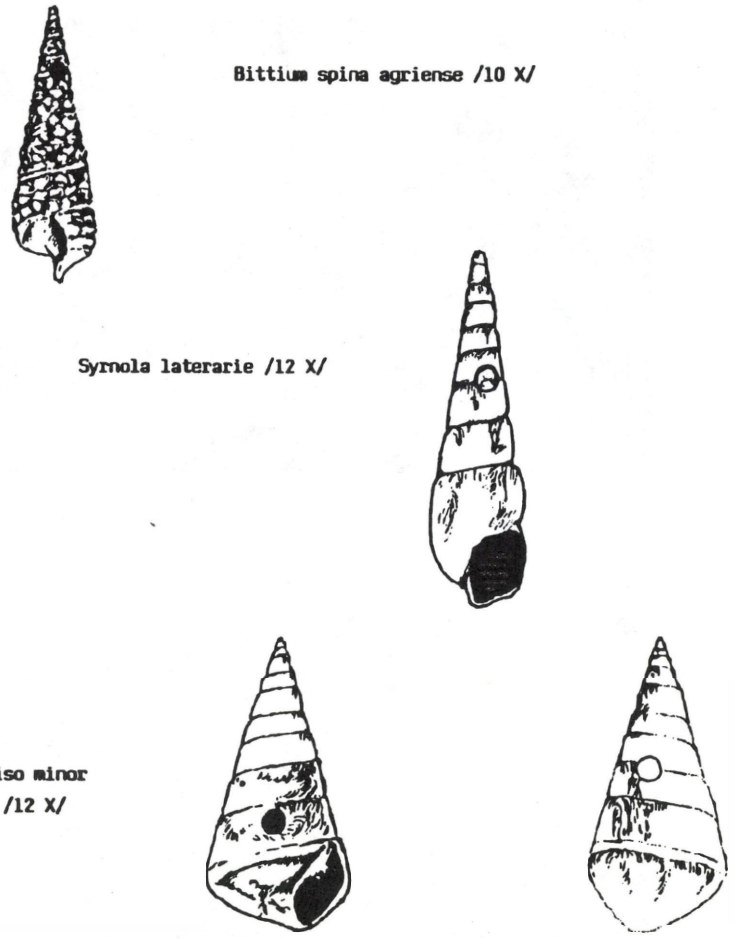


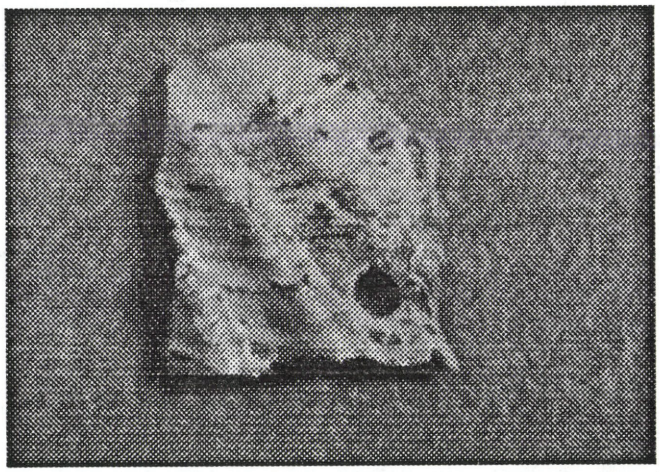
fig. 4.: Positions of Naticid borings in three species of gastropods / Nyárjas Hill, Novaj /

○ incomplete boring

● complete boring

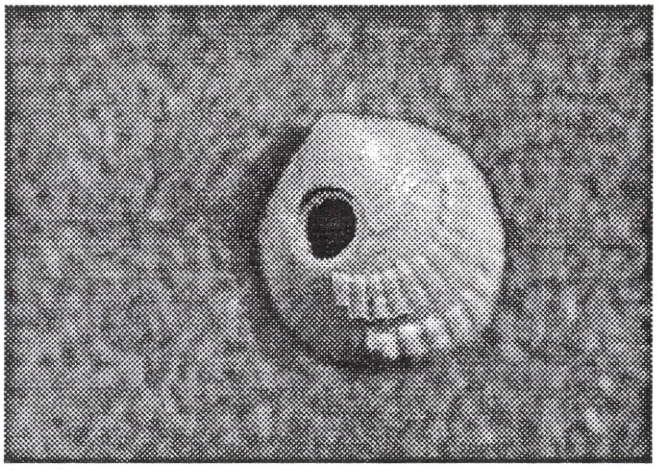
PLATE I.

1. Fungal borings in Cadulus gracilina /11X/

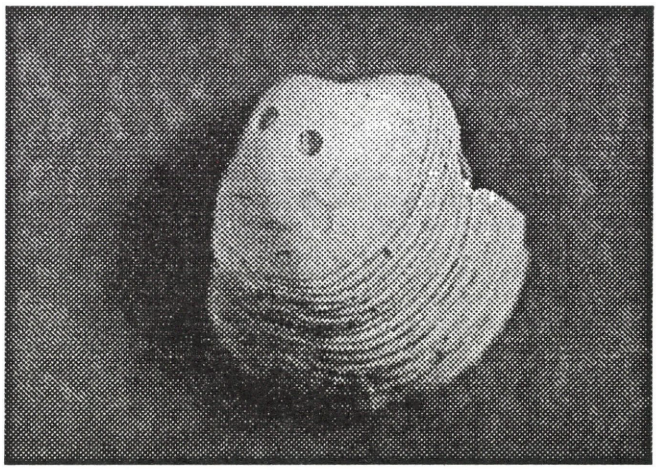


2. Muricid boring in a fragment of a Flabellipecten burdigalensis valve /7X/

PLATE II.

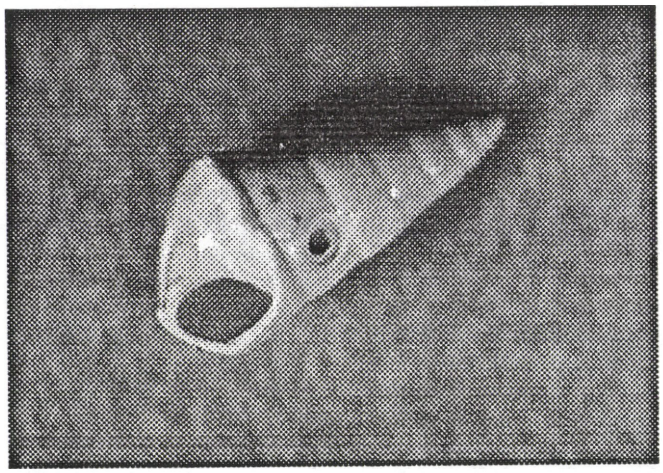


1. Complete Naticid borehole in Cardium sp. /11X/

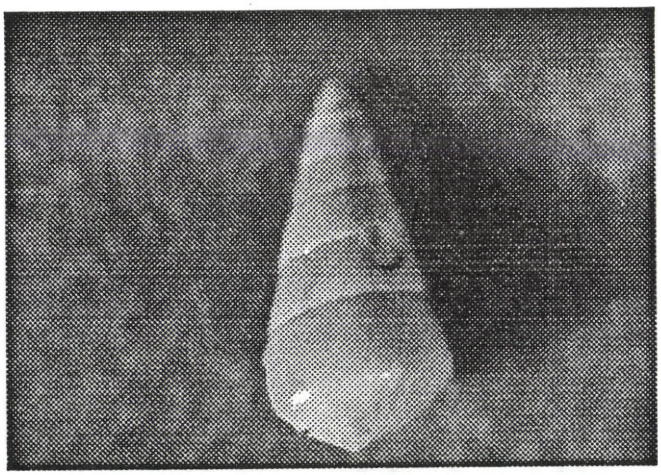


2. Two incomplete Naticid boreholes in Corbula gibba /7X/

PLATE III.



1. Typical Naticid borehole in Niso minor /15X/



2. Incomplete Naticid borehole in the above mentioned Niso minor specimen /15X/